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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,122	09/29/2005	Charles R. Cantor	701586-53303	1567
7590 Ronald I Eisenstein Nixon Peabody 100 Summer Street Boston, MA 02110				
EXAMINER				
HORLICK, KENNETH R				
ART UNIT		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/529,122

Applicant(s)

CANTOR ET AL.

Examiner

Kenneth R. Horlick

Art Unit

1637

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14 and 16-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14, and 16-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/17/08 has been entered.

MAINTAINED REJECTIONS

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 21-23, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landegren et al. (US 2002/0064779) in view of Michnick et al.

These claims are drawn to a kit comprising a first and second complementation molecule, such as would be useful in a method comprising: exposing a target nucleic

acid in a living cell to a first complementation molecule and a second complementation molecule, wherein the first molecule comprises a first polypeptide portion coupled to a first probe portion, and the second molecule comprises a second polypeptide portion coupled to a second probe portion, wherein upon binding of the first and second probe portions to first and second sites in close proximity on the target nucleic acid, the first and second polypeptide portions of the molecules interact and form an assembled complementation complex which is then detected, wherein the first and second probe portions are nucleic acids or nucleic acid analogues. .

Landegren et al. disclose the use of "proximity probes", wherein when first and second binding portions of first and second probes bind to adjacent sites on a target molecule, complementary first and second oligonucleotides attached to said first and second binding portions interact via hybridization and are detected (see Figs. 1-3 and page 1). Note that in paragraph 0010 it is disclosed that the binding portion or moiety may be nucleic acids, and in paragraph 0007 it is disclosed that the target analyte may be a nucleic acid.

While Landegren et al. disclose using complementary nucleic acids on the two binding moieties as the basis for detection of proximate binding sites on a target molecule, they do not disclose the use of polypeptide fragments which form a complementation complex as the basis for detection.

Michnick et al. disclose the use of polypeptide fragments which form a complementation complex as the detection means in a method of detecting proximate binding sites in a target molecule using two binding moieties attached to said

polypeptide fragments (see Fig. 1, columns 3-5, column 18, lines 28-30, and columns 23-31). Note especially column 29, line 61 to column 30, line 25, and column 31, lines 2-20, which disclose an embodiment wherein complementation molecules are brought together by attached nucleic acid-binding proteins which simultaneously bind to nearby regions of a target nucleic acid. Michnick et al. also disclose the use of kits in column 37, lines 27-28.

One of ordinary skill in the art would have been motivated to substitute polypeptides which together form a complementation complex for the complementary nucleic acids in the method of Landegren et al. because such a complementation complex was disclosed by Michnick et al., and would have merely provided a predictable and reasonably likely successful alternative detection means (protein complementation) to the complementary nucleic acid means of Landegren et al. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make and use the claimed kits.

3. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landegren et al. in view of Michnick et al., and further in view of Sodroski et al. (US 5,654,195).

Claim 24 is drawn to the kit as described and rejected above, wherein the first and second polypeptides interact in the complementation complex to form an assembled protein which contains a discontinuous epitope, which may be detected with an antibody.

The teachings of Landegren et al. and Michnick et al. are discussed above. While Michnick et al. broadly suggests the use of any appropriate complementation complexes which can be detected and distinguished from non-complemented fragments, it does not specifically disclose the use of polypeptide fragments which upon complementation form a discontinuous epitope which can be detected with an antibody.

Sodroski et al. disclose that discontinuous epitopes, and antibodies which recognize them, were known in the prior art (see column 12, lines 41-43).

One of ordinary skill in the art would have been motivated to substitute polypeptides which together form a discontinuous epitope recognized by an antibody, for the enzyme-forming polypeptides in the method/kit of Landegren et al. as modified by Michnick et al. because such discontinuous epitopes and antibodies were known and available in the prior art (Sodroski et al.), and would have merely provided a predictable and reasonably likely successful alternative detection means (immunodetection) to the enzymatic detection means of Michnick et al. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make and use the claimed kit.

4. With respect to the above rejections, the arguments of the response filed 11/17/08 have been fully considered, but are not found persuasive. The main argument relates to the newly added language "in a living cell". However, as far as the claimed kits, this language does not further limit any of the kit components (i.e., the first or second complementation molecule), but rather relates only to an "intended use" of the

claimed kit (i.e., use in detecting a target nucleic acid in a living cell). Applicant is reminded that in product claims such as a kit, "intended use" language is not given patentable weight. Regarding paragraph 3 above, the response also points out on page 9 that Sodroski et al. teaches antibodies against discontinuous epitopes on a single molecule, but does not specifically teach an antibody to detect a discontinuous epitope from two separate proteins or polypeptides which have come together by protein complementation. However, the rejection states that Sodroski et al. is being cited to show that discontinuous epitopes and antibodies thereto were known and available in the prior art; hence, together with the teachings of Landegren et al. and Michnick et al., the discontinuous epitope and antibody thereto of the claim are suggested. Thus, the rejection is still considered to establish a proper case of *prima facie* obviousness over the claimed kits.

NEW GROUNDS OF REJECTION NECESSITATED BY THE AMENDMENT

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 25-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims are confusing because it is unclear how a living cell may be "in vivo" or "in vitro". Clarification is required.

6. Claims 1-3, 5-12, 14, 16, 17, 19, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landegren et al. (US 2002/0064779) in view of Michnick et al., and further in view of either of Singer et al. (US 5,728,527) or van Dongen et al. (US 6,730,474).

These claims are drawn to a method comprising: exposing a target nucleic acid in a living cell to a first complementation molecule and a second complementation molecule, wherein the first molecule comprises a first polypeptide portion coupled to a first probe portion, and the second molecule comprises a second polypeptide portion coupled to a second probe portion, wherein upon binding of the first and second probe portions to first and second sites in close proximity on the target nucleic acid, the first and second polypeptide portions of the molecules interact and form an assembled complementation complex which is then detected, wherein the first and second probe portions are nucleic acids or nucleic acid analogues.

Landegren et al. disclose the use of "proximity probes", wherein when first and second binding portions of first and second probes bind to adjacent sites on a target molecule, complementary first and second oligonucleotides attached to said first and second binding portions interact via hybridization and are detected (see Figs. 1-3 and page 1). Note that in paragraph 0010 it is disclosed that the binding portion or moiety may be nucleic acids, and in paragraph 0007 it is disclosed that the target analyte may be a nucleic acid.

While Landegren et al. disclose using complementary nucleic acids on the two binding moieties as the basis for detection of proximate binding sites on a target

molecule, they do not disclose the use of polypeptide fragments which form a complementation complex as the basis for detection. Also, this reference does not teach binding assays carried out in living cells.

Michnick et al. disclose the use of polypeptide fragments which form a complementation complex as the detection means in a method of detecting proximate binding sites in a target molecule using two binding moieties attached to said polypeptide fragments (see Fig. 1, columns 3-5, column 18, lines 28-30, and columns 23-31). Note especially column 29, line 61 to column 30, line 25, and column 31, lines 2-20, which disclose an embodiment wherein complementation molecules are brought together by attached nucleic acid-binding proteins which simultaneously bind to nearby regions of a target nucleic acid. Michnick et al. also disclose the use of kits in column 37, lines 27-28. This reference also teaches that the protein complementation assay may be carried out *in vivo*; that is, in living cells (see abstract; column 5, lines 1-50; column 18, lines 28-34).

Singer et al. disclose methods of carrying out nucleic acid hybridization assays in living cells (see entire patent).

van Dongen et al. disclose that nucleic acid hybridization assays may be carried out *in vivo* (see column 3, lines 33-37).

One of ordinary skill in the art would have been motivated to substitute polypeptides which together form a complementation complex for the complementary nucleic acids in the method of Landegren et al. because such a complementation complex was disclosed by Michnick et al., and would have merely provided a

predictable and reasonably likely successful alternative detection means (protein complementation) to the complementary nucleic acid means of Landegren et al. The skilled artisan would have been further motivated to carry out the method of Landegren et al. as modified by Michnick et al. in living cells because both Singer et al. and van Dongen et al. taught the desirability of carrying out nucleic acid hybridization assays in living cells or *in vivo*, and Michnick et al. taught the desirability of carrying out protein complementation assays *in vivo*. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to carry out the claimed methods.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landegren et al. in view of Michnick et al., further in view of Sodroski et al. (US 5,654,195), and further in view of either of Singer et al. (US 5,728,527) or van Dongen et al. (US 6,730,474).

Claim 4 is drawn to the method as described and rejected above, wherein the first and second polypeptides interact in the complementation complex to form an assembled protein which contains a discontinuous epitope, which may be detected with an antibody.

The teachings of Landegren et al. and Michnick et al., as well as Singer et al. and van Dongen et al., are discussed above. While Michnick et al. broadly suggests the use of any appropriate complementation complexes which can be detected and distinguished from non-complemented fragments, it does not specifically disclose the

use of polypeptide fragments which upon complementation form a discontinuous epitope which can be detected with an antibody.

Sodroski et al. disclose that discontinuous epitopes, and antibodies which recognize them, were known in the prior art (see column 12, lines 41-43).

One of ordinary skill in the art would have been motivated to substitute polypeptides which together form a discontinuous epitope recognized by an antibody, for the enzyme-forming polypeptides in the method of Landegren et al. as modified by Michnick et al. because such discontinuous epitopes and antibodies were known and available in the prior art (Sodroski et al.), and would have merely provided a predictable and reasonably likely successful alternative detection means (immunodetection) to the enzymatic detection means of Michnick et al. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to carry out the claimed methods, and to make and use the claimed kit.

8. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landegren et al. in view of Michnick et al., further in view of Lizardi (US 5,854,033), and further in view of either of Singer et al. (US 5,728,527) or van Dongen et al. (US 6,730,474).

This claim is drawn to the method as described and rejected above, wherein the target nucleic acid is amplified using rolling circle amplification.

The teachings of Landegren et al. and Michnick et al., as well as Singer et al. and van Dongen et al., are discussed above. These references do not specifically disclose rolling circle amplification.

Lizardi discloses rolling circle amplification (see abstract).

One of ordinary skill in the art would have been motivated to use rolling circle amplification to provide target nucleic acid in the method of Landegren et al. as modified by Michnick et al. because Lizardi disclosed that rolling circle amplification was a good means of providing amplified levels of nucleic acids with multiple benefits/advantages. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to carry out the claimed methods.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landegren et al. in view of Michnick et al., further in view of Stefano et al. (US 6,287,772), and further in view of either of Singer et al. (US 5,728,527) or van Dongen et al. (US 6,730,474).

This claim is drawn to the method as described and rejected above, wherein the first and second probes bind to the same sequence in the target nucleic acid such as would form a triplex.

Neither Landegren et al. nor Michnick et al., nor Singer et al. nor van Dongen et al., disclose a proximity probe wherein the two binding portions bind to the same sequence of a target nucleic acid.

Stefano et al. disclose the use of a nucleic acid proximity probe wherein a detection portion on each of two probe strands interacts with the same sequence of a third strand to form a triple helix or triplex (see Figs. 1-11 and columns 2-15).

One of ordinary skill in the art would have been motivated to substitute a triplex detection means for the adjacent binding site means in the method of Landegren et al. as modified by Michnick et al. because such a triplex detection means was disclosed by Stefano et al., and would have merely provided a predictable and reasonably likely successful alternative detection means involving triplex formation. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to carry out the claimed methods.

10. To the extent that they apply with respect to the above rejections, the arguments of the response filed 11/17/08 have been fully considered, but are not found persuasive. The response argues that the method of Landegren et al. is not carried out in a living cell. However, the new rejections set forth above include Singer et al. and van Dongen et al., each of which discloses carrying out nucleic acid hybridization assays in living cells. The separate argument of the response regarding Sodroski is addressed above. On page 10 of the response, a separate argument regarding Stefano is presented, which points out differences between the triplex formed in Stefano and that formed in claim 20. In response, it is noted that the rejection cites Stefano for the broader teaching of nucleic acid detection based on triplex formation; the skilled artisan considering Stefano would have been well aware of the limited number of variant

assays for forming and detecting triplexes, and how to apply such obvious variations in the methods suggested by the combination of cited references. Thus, it is believed that a proper case of *prima facie* obviousness has been established.

11. No claims are free of the prior art.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth R. Horlick whose telephone number is 571-272-0784. The examiner can normally be reached on Monday-Thursday 6:30AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 571-272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kenneth R Horlick/
Primary Examiner, Art Unit 1637

12/01/08